

IX. RESIDENCE ADJUSTMENT

Personal income is a measure of income by place of residence. The place of residence of individuals is the state and county in which they live. The place of residence of quasi-individuals is the state and county of the residence of the individuals who benefit from the activities of the quasi-individuals or on whose behalf quasi-individuals receive income.¹

Accordingly, the residence of military personnel is the state and county in which they live while they are on military assignment, not their permanent or legal state of residence. Thus, the income of military personnel on foreign assignment is excluded from the state and local area personal income estimates, because their residence is outside of the territorial limits of the United States.²

The residence of seasonal migrant workers, except those working in Alaska, is the state and county in which they live while they are working, not their usual place of residence. The residence of Alaskan seasonal migrant workers is their usual place of residence (this is discussed further below). The residence of foreign citizens who work for international organizations, foreign embassies, or consulates in the United States is the country of which they are citizens. Thus their income is excluded from the state and local area personal income estimates.

These definitions of residence differ slightly from some of those used by the Census Bureau, which provides source data that are used in the preparation of the residence adjustment estimates and the estimates of population that are used to calculate per capita personal income. For example, the residence of seasonal migrant workers is sometimes reported to the Census Bureau as their usual place of residence rather than the state in which they are living and working on April 1 when the decennial census of population is taken.

The source data for some components of personal income—personal current transfer receipts, dividends, interest, and rent, and proprietors' income—are recorded, or treated as if they were recorded, on a place-of-residence basis.³

Most of the source data for the remaining three components, which compose more than 60 percent of personal income in 2003, are recorded by place of work. These components are wage and salary disbursements, supplements to wages and salaries, and contributions for government social insurance. Therefore, these place-of-work estimates are adjusted so that they will be on a place-of-residence basis and so that the income of the recipients whose place of residence differs from their place of work will be correctly assigned to state and county of residence of the recipients.

¹ “Quasi-individuals” consist of nonprofit institutions that primarily serve individuals, private noninsured welfare funds, and private trust funds.

² State and local estimates of military wages and salaries for 2001-2003 do not show a large decrease for troops sent to Afghanistan and Iraq. The Department of Defense continues to report active duty regular military strength according to the troops' home bases and reserve strength according to the state of the reservists' bases. For more information see the section “Differences in geographic scope and in classifications between the national and the state and county estimates” in Chapter II Sources and Methods.

³ For specific information about the source data for the estimates of the major components, see the section “Geographic characteristics of the source data” in Chapter II Sources and Methods.

Correctly assigning the place of residence of the recipient of the income is more important for the state and county estimates than for the national estimates. The income of individuals who commute to work between counties is especially important for those counties in multi-county metropolitan areas.

The county estimates of the residence adjustment are prepared for net labor earnings—or “income subject to adjustment”—of intercounty commuters and for the wages of border workers. Income subject to adjustment is defined as wage and salary disbursements plus supplements to wages and salaries minus contributions for government social insurance. Estimates of the residence adjustment by industry cannot be published because not all of the source data on which it is based are available by industry.

In what follows residence adjustment procedures for intercounty commuters are discussed first. This is followed by a discussion of procedures for border workers.

Procedure for the income of intercounty commuters

The 2001 county estimates of the residence adjustment were calculated as part of a complete benchmark revision of the personal income and employment estimates. Briefly, using journey to work data from the 2000 decennial Census of Population, each earnings inflow to a given county was divided by the corresponding amount paid to all those working in the source county. Each earnings outflow from the given county was divided by the corresponding amount paid to all those working in that county. These benchmark ratios are then applied to the income subject to adjustment (ISA) for 2001 and subsequent years to generate gross inflows and outflows. The sum of the outflows from a given county are subtracted from the sum of inflows to that county to yield the net residence adjustment for intercounty commuters. More complete details follow.

The county estimates for 2001 were derived in three steps. First, a provisional estimate for each county was prepared using intercounty commuting data from the 2000 Census of Population.⁴ Second, the provisional estimates for some counties were modified. Third, the modified provisional estimates for some counties were adjusted.

Provisional estimates for 2001.—The procedure that is used to prepare the provisional estimates of the county residence adjustment for 2001 is illustrated by the following example for a two-county area that comprises counties f and g . The example is easily generalized to the calculation of estimates for more complex areas.

The provisional 2001 estimate of the residence adjustment for county f (RA_f) was calculated as the total 2001 inflows of the income subject to

⁴ The benchmark year had to be 2001 instead of 2000 because 2001 is the first year that BEA estimates earnings and employment using the North American Industry Classification System (NAICS), the classification system used (with some modification) by the 2000 Census of Population. BEA's estimates of earnings and employment for 2000 are based on the 1987 Standard Industrial Classification (SIC).

adjustment to county f from county g ($IN_{f,g}$) minus the total 2001 outflows of the income subject to adjustment from county f to county g ($OUT_{f,g}$).

$$RA_f = IN_f - OUT_f$$

The estimates of $IN_{f,g}$ and $OUT_{f,g}$ were prepared in industrial detail.⁵ The inflow ratio ($I_{f,g,k}$) is the share of total wages in a particular industry k in county g that were earned by residents of county f . It was used in the estimation of industry-level inflows to county f . Analogously, the outflow ratio ($O_{f,g,k}$) is the share of wages in industry k in county f that were earned by residents of county g . It was used in the estimation of industry-level outflows from county f . Both $I_{f,g,k}$ and $O_{f,g,k}$ were calculated from journey-to-work (JTW) data on the number of wage and salary workers (W) and their average wages (A) by county of work for each county of residence from the 2000 Census of Population.

$$\begin{aligned} I_{f,g,k} &= \frac{\text{wages earned in } g \text{ by residents of } f}{\text{total wages earned in } g} \\ &= \frac{(W_{(f \rightarrow g),k})(A_{(f \rightarrow g),k})}{(W_{(f \rightarrow g),k})(A_{(f \rightarrow g),k}) + (W_{(g \rightarrow g),k})(A_{(g \rightarrow g),k})} \\ O_{f,g,k} &= \frac{\text{wages earned in } f \text{ by residents of } g}{\text{total wages earned in } f} \\ &= \frac{(W_{(g \rightarrow f),k})(A_{(g \rightarrow f),k})}{(W_{(g \rightarrow f),k})(A_{(g \rightarrow f),k}) + (W_{(f \rightarrow f),k})(A_{(f \rightarrow f),k})} \end{aligned}$$

Where two subscripts are used with an arrow, the first subscript identifies the place of residence, and the second identifies the place of work. For example, $W_{(f \rightarrow g),k}$ is the number of workers in industry k who lived in county f but who worked in county g .

The industry-level inflows to county f from county g ($IN_{f,g,k}$) were calculated as the inflow ratio multiplied by the corresponding component of the income subject to adjustment (ISA) in industry k in county g ($ISA_{g,k}$). The

⁵ The inflows and outflows of wages and salaries and of supplements to wages and salaries were estimated for private industries by NAICS sectors and for the public sector by Federal civilian, military, and state and local governments. The inflows and the outflows of personal contributions were estimated at a more aggregated level because estimates of contributions for government social insurance by private-sector employees are not made by industry.

industry-level outflows from county f to county g ($OUT_{f,k}$) were calculated as the outflow ratio multiplied by the ISA in industry k in county f ($ISA_{f,k}$).

$$IN_{f,k} = (I_{f,k})(ISA_{g,k})$$

$$OUT_{f,k} = (O_{f,k})(ISA_{f,k})$$

Summing the inflows for all industries yields the total inflows to county f (IN_f), and summing the outflows for all industries yields total outflows from county f (OUT_f).

$$IN_f = \sum_{k=1}^N IN_{f,k}$$

$$OUT_f = \sum_{k=1}^N OUT_{f,k}$$

Modifying the provisional 2001 estimates.—The provisional 2001 estimates of the residence adjustment for some counties were modified in three cases. These modifications were made to the overall residence adjustment, not to the flows by industry.

Cluster county adjustment. In the first case, the estimates for each of the over 1200 counties that are in urban clusters that have high rates of commuting among their constituent counties (mostly multicounty metropolitan areas) were modified to incorporate the 1999 distribution of wages and salaries from the 2000 Census.⁶ The estimates for these counties were modified because in numerous cases, the geographic coding by place of work of the JTW data and that of the source data for BEA's wages and salaries are inconsistent.⁷

First, the provisional estimate of wages and salaries by place of residence for each county in each cluster was calculated as the sum of wages and salaries by place of work plus the net residence adjustment for wages and salaries.⁸ Second, the provisional place-of-residence estimates of wages for the counties in each cluster were summed to a total estimate for the cluster. Third, the total estimate for each cluster was allocated to the counties of the cluster in proportion to the 1999 wage-and-salary distribution from the 2000 Census in order to

⁶ A BEA cluster county is one county in a group of counties that has a high rate of commuting with other counties in the group. BEA clusters are based mostly on official metropolitan area definitions. The 1999 distribution of wages and salaries reflects the place of residence of the income recipients on April 1, 2000, not their place of residence when they received the wages and salaries.

⁷ For example, the source data may attribute too much of the wages of a multi-establishment firm to the county in which a firm's main office is located; the source data for the wages of the personnel employed on a military base that extends across county boundaries may attribute the wages to one county, but the JTW data may attribute these wages to the other county.

⁸ The net residence adjustment that is used for this calculation includes only the intercounty flows for wages and salaries.

produce the modified provisional estimates of wages and salaries by county of residence. Fourth, the estimate of the residence adjustment for each county in the cluster was calculated as the modified provisional estimate of place-of-residence wages minus the provisional estimate of place-of-residence wages plus the provisional estimate of the residence adjustment.

The difference between the estimate of the residence adjustment and the provisional estimate of the residence adjustment was expressed as a flow between pairs of counties in the same cluster in order to facilitate the extrapolation of the 2001 residence-adjustment estimates to subsequent years. In the simplest situation—a two-county cluster—the additional flow was assumed to be from the county with the negative difference to the county with the (exactly offsetting) positive difference. The flows were then divided by the appropriate ISA to form the cluster county adjustment ratio.

Adjacent county adjustment. In the second case, the provisional estimate of the residence adjustment for each county in 136 pairs of adjacent counties that are not in a cluster was modified because the 2001 provisional place-of-residence estimate of wages for one of the counties exceeded the place-of-residence measure of wages from the 2000 Census by a substantial amount and because the census measure for the other county exceeded the provisional estimate by a similar substantial amount. In order to facilitate the extrapolation of the 2001 residence-adjustment estimates to subsequent years, these adjacent-county modifications were also expressed as intercounty flows and converted to a ratio by dividing by ISA.

Alaskan seasonal worker adjustment. In the third case, the provisional 2001 estimates of the residence adjustment for eight county equivalents (boroughs and Census areas) in Alaska were modified to account for the large amounts of ISA received by seasonal workers from out of state. The provisional estimates yielded place-of-residence estimates of wages and salaries that were so much higher than the comparable decennial census data that they could not be an accurate reflection of only the wages of the permanent residents. In order to remove the excess amounts, the JTW-data-based outflows from these county equivalents to selected large counties in Washington, Oregon, and California were judgmentally increased. In order to facilitate the extrapolation of the 2001 residence adjustment estimates to 2002-2003, these modifications to the eight county equivalents in Alaska were also expressed as intercounty flows and converted to a ratio by dividing by ISA.

A preliminary estimate of net intercounty commuting flows was then made by summing the gross inflows, deducting the sum of the gross inflows and adding the adjustments for cluster counties, adjacent counties, and Alaskan seasonal workers. The net flows for cluster counties receive one further adjustment as discussed next; the net flows for other counties are final.

IRS Adjustment.—The preliminary net intercounty commuting flows for cluster counties were adjusted using county tabulations of wages, salaries, and tips reported on individual income tax return form 1040 from the Individual Master File of the Internal Revenue Service (IRS). The change from 1999 to 2001 in

each county's share of its cluster's total IRS wages was used to extrapolate that county's share of its cluster's residence-adjusted income subject to adjustment (RAISA).⁹ The extrapolated shares were then multiplied by the cluster's RAISA to obtain an estimate of county RAISA. The difference between RAISA and ISA is the secondary estimate of the net flow for that county.

The final estimate of the net intercounty commuting flow is a weighted average of the preliminary and secondary estimates. The preliminary estimate is weighted 70% and the secondary estimate 30%.

Procedure for the income of intercounty commuters, 2002-2003.—A similar set of procedures was used to estimate the intercounty commuting flows for the years since 2001. The cluster county, adjacent county, and Alaskan seasonal worker adjustment ratios along with the inflow and outflow ratios computed for 2001, were applied to each subsequent year's income subject to adjustment to prepare a preliminary estimate of net intercounty commuting flows. As before, the net flows for cluster counties are only a preliminary estimate; the net flows for other counties are the final estimate. The IRS adjustment was then applied to the preliminary net flows for cluster counties to prepare the secondary estimates. The final estimate of the net intercounty commuting flows for cluster counties is a weighted average of the preliminary and secondary estimates. The preliminary estimate is weighted 60% in 2002 and declines 10 percentage points per year in subsequent years.

Procedure for the income of intercounty commuters, 1990-2000

The county estimates of residence adjustment for 1990-2000 were developed using journey-to-work (JTW) data on intercounty commuting from both the 1990 and 2000 Census of Population. Estimates for the earlier years were based more heavily on the 1990 JTW data, while the later years were based more on the 2000 JTW data.

Preliminary estimates for 1990-2000.—The preliminary estimates for 1990-2000 were developed by using a sequential set of procedures. First, intercounty commuting ratios were developed from both the 1990 and 2000 JTW data. The ratios show the percentage of wages earned in a county that were earned by residents of other counties. The 1990 JTW ratios were based on Standard Industrial Classification (SIC) industry categories, while 2001 JTW ratios were developed from the 2000 JTW data at an all-industry level.¹⁰

⁹ Residence-adjusted income subject to adjustment (RAISA) equals income subject to adjustment (ISA) plus residence adjustment.

¹⁰ JTW ratios for 2001, instead of 2000 ratios, were developed because the 2000 JTW data is based on the North American Industry Classification System (NAICS), while BEA's 2000 income and employment data is based on the Standard Industrial Classification (SIC). The first year that BEA has income and employment estimates available that are based on NAICS sectors is for 2001. For this reason, 2001, instead of 2000, became the benchmark year to apply the new 2000 JTW commuting data.

The intercounty commuting ratios for 1990 and 2001 were multiplied with income subject to adjustment estimates for 1990-2000 to derive estimates of gross commuting flows between counties. These commuting flows were weighted so that the earlier years were weighted more heavily by the 1990 ratios, while the later years were weighted more heavily by the 2001 ratios. The commuting flow data was then summed to the county level to determine net flows based on JTW data.¹¹

In addition, weighted benchmark year adjustment ratios for BEA cluster counties were developed for 1990-2000 to account for differences between the results of the JTW data and the residential-based wage data that were calculated in both the 1990 and 2000 Census of Population. These ratios were applied to total income subject to adjustment (ISA) to develop additional gross flow estimates for these cluster counties. These additional gross flows were then summed to the county level to obtain net flows for 1990-2000.

Next, benchmark adjustment ratios were developed for 136 pairs of non-cluster counties that had significant differences between JTW-based residential wage estimates and those from the decennial census. In these cases, 1990-based non-cluster ratios were applied to ISA for 1990-2000 because 2000-based ratios were not yet available.

Benchmark adjustment ratios were also developed to account for large differences between JTW-based residential wage estimates and residential wage estimates from both the 1990 and 2000 Census of Population for eight county equivalents in Alaska. These ratios were used to remove excess amounts of JTW-based inflows from these counties, and to insert the inflows into selected large counties in Washington, Oregon, and California.

Finally, estimates of commuting between Canada and Mexico were developed for 1990-2000. These border flow estimates were controlled to the residence adjustment estimates for the United States (see "Procedure for the Income of Border Workers" in this document for more information).

The gross flow estimates from the above steps were summed for each county. The resulting gross flows were then summed to the county level to obtain net flows. The total net flows were the final residence adjustment estimates for non-cluster counties. For cluster counties, the total net flows were the preliminary estimates of residence adjustment.

Modifying the preliminary estimates for cluster counties, 1990-2000.—The 1990-2000 residence adjustment estimates for cluster counties were modified by annual place-of-residence based IRS wage and salary data that BEA uses to supplement the JTW data from both the 1990 and 2000 Census of Population. The IRS wages were used to determine the relative growth rates of income for cluster counties between the decennial census years.

All-industry JTW ratios for 2001 were developed to apply to BEA income subject to adjustment (ISA) data because BEA estimates of income and employment for 1990-2000 are based on SIC definitions of industries.

¹¹ The core counties in large urban areas (i.e. Cook County, IL) often have negative net flows. This is a result of the large number of people who work in the core county but reside in nearby counties. These "outflows" from the core county often exceed the "inflows" of income that residents of the core county earn in other counties.

First, ratios of residence-adjusted income subject to adjustment (RAISA) to IRS wages were calculated for 1990 and 2001 for each cluster county. Second, the 1990 and 2001 ratios were used to develop weighted RAISA/IRS ratios for 1990-2000 for each cluster county based on the difference amount between the 1990 and 2001 ratios. The difference amount was weighted throughout the decade to capture the relative growth over time. Third, the weighted ratios for 1990-2000 were multiplied with the actual 1990-2000 IRS wage estimates to create adjusted IRS wages for the cluster counties.

Next, each cluster county's relative share of adjusted IRS wages for 1990-2000 within its BEA county cluster was calculated. This relative share for each cluster county was multiplied with its county cluster total of RAISA to derive adjusted RAISA estimates for each cluster county for 1990-2000.

The final residence adjustment estimates for 1990-2000 for cluster counties were calculated by subtracting total income subject to adjustment (ISA) from the adjusted RAISA estimates.

Procedure for the Income of Border Workers

The residence adjustment for the income earned by border workers accounts for the inflows of the wages and salaries earned by U.S. residents who commute to work in Canada and the outflows of the wages and salaries earned by Canadian and Mexican residents who commute to work in the United States.¹²

The national estimates of inflows and outflows of the wages and salaries of the border workers are prepared in the context of the balance of payments accounts.¹³ The state and county estimates of the inflows and the outflows of the wages and salaries of border workers are allocations of the national control totals. The allocated inflows are added to, and the allocated outflows are subtracted from, the estimates of the net residence adjustment for the income of intercounty commuters to obtain the final residence adjustment estimates.

¹² Foreign workers can be classified in three groups: border workers, migrants, and resident aliens. Border workers live in one country and work in another country. They commute to work on a daily or weekly basis. Migrant workers live and work for part of a year in a foreign country but return to their home country for the rest of the year. Resident aliens live and work in a foreign country permanently (that is, for a period longer than a year). No distinction is made between legal and illegal presence. The estimates of state and county personal income count the income of migrants in the state and county in which they work. This treatment differs from how the balance of payments accounts' incomes treats their income—it is treated as an export of compensation. The estimates of state and county income and the balance of payments accounts agree in the treatment of the income of border workers and resident aliens. The income of resident aliens is counted in the income of the state and county in which they work. The income of border workers is excluded—through the residence adjustment in the state and county personal income estimates and by classification as an export in the case of the balance of payment accounts.

¹³ For further information on the treatment and measurement of the income of foreign workers in the balance of payment accounts see *The Balance of Payments of the United States: Concepts, Data Sources, and Estimating Procedures* (May 1990), pp. 56 and 58; Christopher L. Bach, "U.S. International Transactions, Revised Estimates for 1974-96," *Survey of Current Business* 77 (July 1997):52-53; Christopher L. Bach, "U.S. International Transactions, Revised Estimates for 1982-98," *Survey* 79 (July 1999):70; and Christopher L. Bach, "Annual Revision of the U.S. International Accounts, 1992-2002," *Survey* 83 (July 2003):44-45.

The national estimate of the inflows of the wages and salaries earned by U.S. residents who commute to work in Canada are assigned to Michigan, New York and the New England region on the basis of fragmentary information from the Immigration and Naturalization Service of the Department of Justice. The New England portion is allocated to the border counties of Maine, New Hampshire, and Vermont in proportion to data for employment in the forest product industries.

The national estimates of the outflows of the wages and salaries earned by residents of Mexico and Canada who commute to work in the United States are allocated to states and counties in proportion to data from the Immigration and Naturalization Service.